

U.S. Patent Application Serial No. **09/731,726**  
Reply Brief dated October 21, 2003  
Reply to OA of **August 26, 2003**

**REMARKS**

(1). In Section (1) of the Examiner's Answer, the Examiner confirms the statements made in the corresponding section of the Appeal Brief.

(2). In Section (2), the Examiner indicates that: "The brief does not contain a statement identifying the related appeals and interferences ...." However, Appellants believe that the Appeal Brief does contain the required statement. In Section II of the Appeal Brief, entitled "RELATED APPEALS AND INTERFERENCES", at the bottom of page 1, the Appeal Brief states: "Appellants know of no other appeals or interferences which will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal."

(3) to (8). In Sections (3) to (8) of the Examiner's Answer, the Examiner confirms the statements made in the corresponding sections of the Appeal Brief.

(9). In Section (9), the Examiner lists the prior art relied upon in the rejection, listing three references: Ogashiwa '224, Akamatsu JP'427 and Bult '425. The Examiner indicates that PL 115725 (Kozlowski), JP2000025476 (Matsumoto et al.) and Arai et al. have been withdrawn as cumulative references. Appellants acknowledge this withdrawal, which is relevant to Issue A, in which the rejection was over PL 115725 (Kozlowski), JP2000025476 (Matsumoto et al.), Arai et al., Ogashiwa '224 and Akamatsu JP'427, and Issue B, in which the rejection was over these references and further in view of Bult '425.

U.S. Patent Application Serial No. **09/731,726**  
Reply Brief dated October 21, 2003  
Reply to OA of **August 26, 2003**

(10). In Section (10), the Examiner restates the rejection in Issue A as a rejection of claims 1-6 under 35 U.S.C. 103(a) over Ogashiwa '224 and Akamatsu JP'427. The Examiner now summarizes the rejection by citing Ogashiwa '224 for disclosing "the features including the claimed semiconductor structure and Sn-Ag solder bump," again noting "Ogashiwa et al. does not disclose the alpha ray in Sn." Akamatsu JP'427 is cited for disclosing "alpha ray could be reduced from a solder bump in the same field of endeavor or the analogous metallurgical art." The stated motivation is "to eliminate soft error inversion ratio of semiconductor device."

The Examiner restates the rejection in Issue B as a rejection of claims 15-16 over Ogashiwa '224 and Akamatsu JP'427, and further in view of Bult et al. The Examiner cites Bult et al. in column 1, line 65, to column 2, line 6, for teaching "zone refining/melting of Sn in the same field of endeavor or the analogous metallurgical art to purify Sn."

(11). In Section (11), the Examiner presents a Response to Arguments. Appellants here reply to the Examiner's remarks.

The Examiner first notes with respect to Appellants' arguments on the examples in Ogashiwa and Akamatsu JP'427 that: "it is well settled that the examples of the cited reference are given by way of illustration and not by way of limitation." Appellants submit that the point of this comment is unclear. Appellants' arguments in the Appeal Brief addressed what was specifically disclosed in the Examples in the references, which is relevant to interpreting what the reference actually suggests or motivates to one of skill in the art. That is, Appellants have carefully discussed what was "illustrated" by the examples in the references. In fact, Appellants specifically raised the point that

U.S. Patent Application Serial No. 09/731,726  
Reply Brief dated October 21, 2003  
Reply to OA of August 26, 2003

the Examiner had not properly argued that the combination of limitations was suggested by the references (bottom of page 6 to top of page 7 of the Appeal Brief). The Examiner's comments do not appear to rebut Appellants' arguments.

The Examiner then addresses (bottom of page 5 of the Examiner's answer) Appellants' arguments regarding the "<0.1 cph/cm<sup>2</sup>" range in Akamatsu JP'427, stating only that "the claimed  $\alpha$ -rays are overlapped by  $\alpha$ -rays of cited reference." In response, Appellants note that they have acknowledged in the Appeal Brief that there is overlap in the range, since "<0.1 cph/cm<sup>2</sup>" includes everything down to zero, but have addressed this point in detail on pages 10-11 of the Appeal Brief.

The Examiner then states that Appellants' arguments on page 8, first full paragraph of the Appeal Brief are inconsistent due to the transition expression "having". In response, Appellants respectfully submit that this statement is unclear. Other ingredients in the alloy are irrelevant to Appellants' arguments in this paragraph of the Appeal Brief. Appellants also address this point below with regard to the Examiner's remarks on page 7, 3<sup>rd</sup> paragraph, of the Examiner's answer.

In the second paragraph on page 6, the Examiner again refers to the phrase in *In re Wertheim* that "the disclosure in the prior art of any value within a claimed range is an anticipation of that range." Appellants again respectfully submit that the Examiner has misconstrued the meaning of that phrase. Appellants carefully discussed the meaning of this in the Appeal Brief, arguing that this applies to **anticipation** of a claim having a range, by a **value** in the reference. Claim anticipation

U.S. Patent Application Serial No. 09/731,726

Reply Brief dated October 21, 2003

Reply to OA of August 26, 2003

is not an issue here. Moreover, Appellants have particularly discussed actual **values** disclosed in the references relative to claimed ranges, and how these relate to the rejections under 35 U.S.C 103(a), in the Appeal Brief in the discussion of the examples in the references. Appellants have noted that, in fact, the compositional values in examples the references fail to meet the limitations of the present claims.

The Examiner then refers to Appellants' discussion of Pb in Ogashiwa et al. (page 9, last paragraph, of the Appeal Brief). The Examiner states "But, Pb is not an essential element in Ogashiwa." However, Appellants' had not stated that Pb is essential in Ogashiwa; Appellants had argued that Pb was **suggested** in Ogashiwa. Appellants believe that this is an important point in their arguments addressing the **motivation** to combine Ogashiwa '224 with Akamatsu '427, **in which there can be no Pb**. The Examiner's comment about "omission of an element" in *Ex parte Rainu* and *In re Karlson* is not relevant to this point. Appellants maintain that their argument that **the Examiner's proposed combination requires an additional limitation in Ogashiwa that is not taught in the reference**, is valid.

At the bottom of page 6 of the Examiner's answer, the Examiner again notes the overlap of the range "<0.1 cph/cm<sup>2</sup>" in Akamatsu with the claimed range of 0.01 cph/cm<sup>2</sup> or less. Again, Appellants acknowledge that there is overlap in the ranges, but Appellants have argued that there is no **specific suggestion or motivation** in the references for the narrower range of the claims. In this case, Appellants argue that an upper limit in the claimed range of less than one-tenth of the upper

U.S. Patent Application Serial No. 09/731,726  
Reply Brief dated October 21, 2003  
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limit value in the reference represents a **specific limitation not actually suggested by the reference.**

The Examiner then states, with regard to Ogashiwa's silence on the amount of  $\alpha$ -ray: "But, the claimed  $\alpha$ -ray reads on zero which suggest said ray need not be disclosed by reference." Appellants respectfully submit that the Examiner's position here is in error. Low amounts of  $\alpha$ -ray **can only be obtained by special effort**; in fact, "**zero**" is **probably impossible**. This is a clear **limitation not found in the reference**. The amount of  $\alpha$ -ray is a characteristic, not a chemical component. The claim reads on zero  $\alpha$ -rays but the reference **does not disclose** this limitation; "silence", i.e., lack of disclosure, is not a disclosure of this limitation.

On page 7, third paragraph, the Examiner addresses Appellants' additional argument of "unexpected results" on page 12, fifth paragraph, of the Appeal Brief. Appellants maintain that their "unexpected results" argument is valid and respond to the Examiner's arguments as follows.

First, the Examiner's comment about the "transition expression 'having'" not excluding other elements refers to Appellants' arguments in the last paragraph of page 12 of the Appeal Brief, in which Appellants noted a specific reason for the claimed upper limit of 2.8% on Ag content, related to the reaction of Sn with Au, Ni and Cu. It is true that this argument for "unexpected results" would only be relevant in the case of these metals being present. However, at least one of these metals is present in most of the previously cited prior art teachings, and therefore the argument was relevant to what is unexpected over these references. In particular, Ogashiwa et al. '224, the main reference still cited, **requires Ni**, and therefore this argument is fully relevant to what is unexpected over

U.S. Patent Application Serial No. 09/731,726  
Reply Brief dated October 21, 2003  
Reply to OA of August 26, 2003

Ogashiwa.

The Examiner then states: "And the claimed Sn content is met by Ogashiwa." Appellants respectfully submit that the meaning of this statement and its relevance to the "unexpected results" argument is unclear.

The Examiner then states: "Moreover, the Ag range from 0 to less than 1.5 wt.% in Figure 3 has the same property as the claimed range, which shows the claimed Ag range is not critical from end-point to end-point." Here, the Examiner refers to Fig. 3 of the present application, in which Generation Ratio is plotted against Ag composition, in a figure showing the relationship between Ag content and needle-like projection generation ratio in a Sn-Ag solder alloy (page 9, 3<sup>rd</sup> paragraph, of the specification). This Figure corresponds to the disclosure in the middle of page 6 to top of page 7 of the specification.

The Examiner's argument appears to be that below about 3% Ag, the generation ratio is close to zero, and Figure 3 shows no data to indicate a difference in this parameter. However, Appellants never argued that there was a difference in **generation ratio** associated with Ag values below 1.5 wt%. Rather, on page 13, first paragraph, of the Appeal Brief, Appellants argued that the unexpected result associated with Ag less than 1.5 wt% involved the **transformation from  $\beta$ -Sn to  $\alpha$ -Sn**, a different parameter than generation ratio. The Examiner's arguments are therefore irrelevant.

The Examiner states that: "The benefit of the claimed combination cannot be seen. Comparison must be done under identical conditions except for the novel features of the invention." However, Appellants have provided a **specific rationale for a combination of specific numerical limitations**, with data to show that the claim limitations affect certain properties in a way not

U.S. Patent Application Serial No. **09/731,726**  
Reply Brief dated October 21, 2003  
Reply to OA of **August 26, 2003**

suggested by the references.

Appellants submit that it is unclear which comparison the Examiner is requesting. In particular, it is not clear which Examples of the prior art could be selected for direct comparison with the present invention due to the compositional differences of the prior art examples from the present invention. (The prior art does not have **any** examples meeting both the Ag and Sn limitations of the claims under appeal, as discussed in the Appeal Brief). Appellants submit that the benefit of the claimed combination can be seen from the provided data, and that the benefit is unexpected over the prior art.

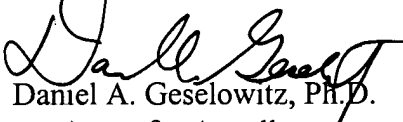
In Summary, Appellants have addressed the Examiner's arguments in the Examiner's Answer and Appellants do not believe that any of the Examiner's arguments successfully rebuts Appellants' appeal of the rejections as stated in the Appeal Brief. Appellants therefore submit that the arguments in the Appeal Brief are fully relevant to Issues A and B, as restated by the Examiner, and Appellants maintain their appeal of the rejections.

U.S. Patent Application Serial No. **09/731,726**  
Reply Brief dated October 21, 2003  
Reply to OA of **August 26, 2003**

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP

  
Daniel A. Geselowitz, Ph.D.  
Agent for Appellants  
Reg. No. 42,573

DAG/plb  
Atty. Docket No. **001616**  
Suite 1000  
1725 K Street, N.W.  
Washington, D.C. 20006  
(202) 659-2930



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